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UNIVERSITY OF WISCONSIN STUDIES  
IN THE SOCIAL SCIENCES AND HISTORY  
NUMBER 8

STANDARD TESTS AS AIDS IN SCHOOL  
SUPERVISION

ILLUSTRATED BY A STUDY OF THE STOUGHTON,  
WISCONSIN, SCHOOLS

BY  
FRANK LESLIE CLAPP  
ASSOCIATE PROFESSOR OF EDUCATION

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## CONTENTS

### SECTION I—THE SCHOOL AS A WHOLE

	Page
General explanation .....	7
General results of tests .....	9
Significance of test results .....	12
The classification of pupils tested.....	13
Boys and girls compared .....	16
Diagnosis of work in reading.....	19

### SECTION II—INDIVIDUAL ROOMS AND PUPILS

The responsibility of the teacher.....	25
Plan for reporting results to teachers and pupils.....	27
Diagnosing a showing in language.....	32
Diagnosing a showing in arithmetic.....	32
Remedial and constructive work in spelling.....	38
Grouping of pupils for instruction.....	39
Tests in the high school .....	42

### SECTION III—SOME SPECIAL PHASES

How elementary pupils spend their time.....	45
Some characteristics of instruction.....	50
How teachers spend their time .....	52
Results of intelligence and scholastic tests compared.....	53





## INTRODUCTION

The use of standard tests in the schools has become very common. In many cases, perhaps in the larger number, the work has ended with a mere evaluation of general conditions—a comparison of the showings of the various rooms with the standards.

Two possible reasons account for this. *First*, the procedure to be followed in such analyses has not been determined in any complete way. *Second*, the amount of detailed work necessary for a complete analysis of the scholastic and intelligence levels of a considerable number of pupils is very great.

The present study constitutes an attempt to exemplify in concrete form a procedure that may be used in a more detailed analysis of school conditions than is ordinarily attempted. Since the work has been completed, the imperfections of many of the methods used stand out clearly. It is hoped, however, that others may be encouraged to perfect a procedure that may be far more helpful in the work of our schools.

As to the second of these considerations, there is no question as to the fact that teachers and supervisors are burdened with work. This condition comes, perhaps, from the very commendable conception that the first and all-important duty of teachers is to teach and of supervisors to direct the work of teaching. While this is true, it yet seems rather obvious that a careful and complete diagnosis of the conditions with which a teaching corps is working should be of considerable assistance in the most effective direction of that work. In fact, such a diagnosis would seem to be a first essential. It is true that the amount of work necessary for a study such as that made in the Stoughton schools and reported herein may seem altogether too large for a superintendent and his teachers to undertake alone. Such would be the case if the work is regarded as something aside from, and in addition to, the regular work of teaching. However, there is large justification

for the notion that such work is a legitimate part of the work of teaching and may well be substituted for a portion of the work of "hearing classes" or "directing study."

The field work and general tabulation were carried on by a class of students in the University of Wisconsin in connection with a course entitled, Surveys and Tests, during the spring of 1920. In the summer following another class completed the detailed analysis of data.

Grateful appreciation is hereby expressed to Superintendent C. J. Anderson of the Stoughton schools, now Assistant Superintendent of Public Instruction for Wisconsin. The study was made possible only by the active sympathy of Mr. Anderson and his teachers toward such work and by their enthusiastic and unstinted assistance.

F. L. C.

## SECTION I

### THE SCHOOL AS A WHOLE

#### GENERAL EXPLANATION

The purpose in using standard tests of scholastic attainment in the schools was to reveal the points of strength and of weakness in the school as a whole, in single rooms, and in the work of individual pupils. In order to do this at all fully, it seemed necessary to use a rather large number of tests. The following tests were used in all grades for which they are intended:

Writing	Arithmetic
Ayres	Woody
Speed	Addition
Quality	Subtraction
Spelling	Multiplication
Ayres	Division
Geography	Monroe
Hahn-Lackey	Diagnostic Tests
Reading	Clapp
Monroe	Problems
Speed	Language
Comprehension	Trabue
Haggerty	Completion B. C.
Test I	Clapp
Test II	Correct English
Thorndike	Charters
Sentence	Verbs
Vocabulary	Pronouns

These tests will not be described, since most of them are well known.

Since it seems desirable to make all comparisons with the standard medians<sup>1</sup> in the same terms, the percentage method was used. The following illustrations will make this method clear:

<sup>1</sup>In connection with the Thorndike Visual Vocabulary Test and the Charters Language Tests no standards were available. Consequently these tests were omitted from Table 1, but in determining percentages for individual pupils the median for the room was used in the place of a standard median.

(a) A certain pupil in a sixth-grade room made a score of 18 (problems solved correctly) on Woody's Multiplication Scale. The standard median for sixth grades in this test is 15. The pupil's score is 120 per cent of the standard median score for his grade. We may say he surpassed the standard by 20 per cent.

(b) The sixth-grade room in the West Side School made the records given below, with each of which is given the corresponding standard median:

Test	Class Median	Standard Median	Percentage class median is of standard median
Writing			
Speed -----	54.1	71	76
Quality -----	44.6	54	82
Spelling -----	91.9	79	116
Geography -----	82.3	73	112
Reading			
Speed -----	99.2	92	107
Comprehension -----	21.7	21	105
Sentence -----	6.08	6.5	93
Arithmetic			
Addition -----	15.2	16	95
Subtraction -----	13.2	12	110
Multiplication -----	14.8	15	98
Division -----	11.8	10	118
Problems -----	70.5	63.6	110
Language			
Completion B. -----	14.6	12.4	117
Completion C. -----	14.4	12.4	116
Correct English -----	70.2	71.1	98
Total -----	624.58	609.0	102.3 <sup>2</sup>

Percentages for the following were determined by the methods illustrated above: (1) For each pupil in each test; (2) for each room in each test; (3) for each building in each subject; (4) for the entire system in each subject; and (5) for the entire system in all subjects taken together.<sup>3</sup>

The use made of the percentages for individual pupils is explained on page 28. The other percentages appear in Table 1, page 10. It is to be noted in this table that those percentages

<sup>2</sup> This is not the average of the percentages above, but is obtained by dividing the sum of the class medians by the sum of the standard medians.

<sup>3</sup> In calculating these percentages, use was made of Crelle's *Rechentafeln* which greatly reduced the amount of labor involved.

which indicate results in an entire building or for the system as a whole are not averages of preceding percentages, but each one is built up as explained in "b" above.

#### GENERAL RESULTS OF TESTS

A school system even though small is complex, and it is practically impossible for any single individual or group of individuals to secure accurate information concerning its strong and weak points by general inspection. The use of the tests listed above and the determination of percentages as explained made possible the "picture" of conditions in the system which is presented in Table 1.

It is obvious from the explanation in "(b)" above that if the class median for a room is equal to the standard median, the percentage in Table 1 would be 100. Consequently, we may say that in those cases where the percentage is less than 100 the work is below average and needs to be given additional attention.

The percentages at the extreme right of the table are for the entire system. The one for all subjects, 103, is very gratifying to those responsible for the work of the school, since it may be said that as a whole the school is 3 per cent above the average. Noting the percentages for the six subjects, we find the one for writing to be conspicuously low—86 per cent.

Table 1 was reproduced in the form of a large chart with each percentage which was lower than 100 appearing in red. Soon after the opening of school the following year Superintendent Anderson displayed the chart to his teachers and together they discussed the weak points of the school as revealed by the tests.

Since writing stood out as demanding attention primarily, conferences were held, with the result that early in October the following circular was issued:

#### STOUGHTON PUBLIC SCHOOLS

October 7, 1920.

Teachers:

What shall we do to improve the quality and speed of handwriting of our pupils?

1. We ourselves should learn to use the system we are teaching.
2. We should set higher standards for written work. Writing



functions only as we use it. That means that it functions in arithmetic, spelling, written English, etc.

Two sets of arithmetic papers written by a second grade class are now before me. The first set shows an utter lack of standards. Problems are scrawled all over the paper. Some numbers are reversed. Some pupils started in the upper left hand corner and arrived at the lower right hand corner by working diagonally across the page. Every standard of form has been broken.

The second set of papers were written by the same class *one day* later. The teacher had given the pupils some very definite instructions regarding the arrangement of their papers. She corrected some faulty letter formations. The result was astonishing. One can scarcely believe that the same pupils have prepared the two sets of papers. The teacher had set a standard and the pupils had risen to the occasion. If you do not set a high standard of form for written work, and *require all work to conform to that standard* you will get slovenly prepared papers. This has an important bearing upon writing, for writing is a form subject.

We should supervise as much as possible of the writing done by pupils. Writing is a habit involving manual skill. This habit must be developed in the same manner as any other such habit—through the application of the principles of efficient learning. The forming of such a habit is dependent upon: (A) Correct form, and (B) Proper execution of the movement.

A. Correct form involves:

1. Penholding.
2. Position of the arm and hand that does the writing.
3. Position of the other arm and hand.

B. Learning to execute the movement is accomplished by the trial and success method.

*Certain conditions involved in this are under the control of the teacher.*

1. There must be many repetitions of *the right kind*.
2. The pupil must give a high degree of attention to his work. Improvement will not take place otherwise.
3. The right kind of motives should be given the children. They should be conscious of the problem before them. They should know what defects need to be overcome. They should be able to measure the progress they are making by some objective standard. You have been given an "analysis of defects" sheet. Explain this to your pupils. Use it in commenting upon their writing. Show them how to discover their own writing defects, such as letter formation, poor spacing, lack of uniformity in slant and in alignment, etc.
4. A child can very much better imitate the *process of performing an act* than the result of the act after it has been completed. Therefore it is more valuable for the child to see *the teacher writing* than it is to see correct form in a copy book.

This was followed by a rather detailed discussion of certain principles that should determine procedure in teaching pupils to write and the circular closes with the following:

The Unit Plan of Penmanship Practice.

A. Problem.

1. In every room above the third grade there are at least three distinct groups of writers,—the good, the mediocre, and the poor.
2. The needs of these three are as varied as the needs of a class in reading.
3. Where the teacher adapts her instruction to the needs of any one class, the others suffer.

B. Remedy.

1. Organize according to their needs in writing three groups in every room,—the poor, the mediocre, the good.
2. Form three adjacent class rooms into a writing unit (two or four may be used when necessary). Have all the poor pupils go into one room, all the mediocre into a second room, and the good into the third room.
3. Once each six weeks promote pupils from one group to the other.
4. Promote the best writers of the highest group to the lowest room of the unit and allow them to use the writing period for the study of other subjects or as "helpers" for the elementary group.
5. The writing of the pupils in the exempted group must keep up to a standard or they must return to the writing group again.

THE SIGNIFICANCE OF THE PERCENTAGES IN TABLE 1

The percentage for Reading, 117, is the highest of those for the various subjects in Table 1. This was doubtless due to the fact that special attention had been given to this subject for some time. Miss Elda Merton had been employed for one year as supervisor and had given special attention to reading. Together with Superintendent Anderson she had made careful studies of the work of pupils and had suggested to teachers many remedial and constructive measures.<sup>4</sup>

In connection with such percentages as those under discussion, it is evident that even though the percentage is equal to or greater than 100, a school is not justified in lessening its attention to the subject. Such percentage means simply that the work in the subject is as good as, or better than, that found in schools in general and obviously may still be improved. It must be remembered in this connection, however, that stand-

<sup>4</sup>For a report of this work see the *Elementary School Journal*, Vol. 20, 685ff, May, 1920 and 772ff, June, 1920.



ard medians are not averages of class medians from various schools, but are the medians of individual pupil-scores from various schools. Consequently, while we may say that the percentage of 117 in Reading, for example, means that the work in this subject is 17 per cent above average, it is very likely true that one would find but few schools, anywhere, with a higher percentage. Until average or mean variations (above and below 100 per cent) have been determined for schools in general, we cannot state the exact significance of the 117 per cent for Reading. In general it seems safe to say that where such percentages approximate 100 the condition is a cause for congratulation, but it still could and should be improved—how much cannot be specified.

With this understanding, attention was given to the various subjects in the light of general conditions set forth in Table 1 and according to more detailed conditions as described in the section on "Individual Rooms and Pupils" page 25. Conferences were held with the teaching group as a whole and a general policy based upon conditions and underlying principles was emphasized as in the case of writing.

#### THE CLASSIFICATION OF PUPILS TESTED

The gradation of pupils or their classification into groups of somewhat the same scholastic advancement is one of the difficult problems in any school.

In order to determine to what extent pupils in the school were properly classified a careful analysis of the test results was undertaken. In the determination of a method for this study, certain fundamental considerations appeared at once. Among the most important of these were: (1) Relatively few tests were used in the three lower grades; (2) since a pupil may be graded either too high or too low, both the first and the eighth grade should be omitted; (3) certain subjects are much more significant for classification than are others. These and other considerations prompted the adoption of the following rules for the study:

1. Include grades 4, 5, 6 and 7 only.
2. Classify no lower than fourth-grade,—no lower than fifth-grade where a test was not used below that grade.

3. Compare each pupil's scores with the medians for his building rather than with standard medians.
4. Keep the data for each building separate.
5. Consider Reading, Arithmetic, and Language only.

In classifying a pupil he was recognized as being in the proper grade if his score on a test fell between the 75 percentile for the grade below and the 25 percentile for the grade above.<sup>5</sup> If a fifth-grade pupil, for instance, made a score below the 75 percentile for the fourth grade in his building he was ranked in the fourth grade for that test. In the same way, if he made a score above the 25 percentile for the sixth grade, he was classed as a sixth-grade pupil, etc.

Table 2 shows the results of such a classification in a fifth grade of the Central School. The numbers refer to individual pupils, thus enabling their identification. In determining the final classification in a subject the *average* of all rankings was taken. While this method is open to criticism it seemed as good as any other. It should be added, that in finding the averages, fractions, as a rule, were dropped or counted as one, according to which method would locate the pupil nearer the grade in which he was regularly classified.

In Table 2 there are 66 classifications by subjects.<sup>6</sup> Of these, 31, or 47 per cent, correspond to the grade in which the pupil is located; 19, or 29 per cent, are lower than this grade; and 16, or 24 per cent, are higher. Of the last group, 8 are one grade higher than the one in which the pupils are found; 6 are classed two grades higher; and 2 are three grades higher. Taking the combined rankings in the three subjects we have showings for 23 pupils. Of these 13, or 57 per cent, are properly classified; 5, or 22 per cent, are classed beyond their ability by one grade; and 4, or 21 per cent, are classed one or two grades below their real scholastic advancement.

Similar tables were prepared for all the rooms containing grades from four to seven, inclusive. While the percentages in some rooms varied greatly from those given above, in general they corresponded very closely so that it may be said with all confidence that while one-half of the pupils are properly

<sup>5</sup>See any book on statistics for explanation of these terms, *e. g.*, King's *Elements of Statistics*.

<sup>6</sup>No rankings were made where it appeared that the pupil had taken an insufficient number of tests to justify classification.



graded, at least one-fourth are graded too low and one-fourth too high.

An extreme variation from the percentages given above is found in the case of the sixth grade in the West Side School where of 30 pupils 12, or 40 per cent, were properly classified; 14, or 47 per cent, were classified too high, and 4, or 13 per cent, were classified too low.

Another point of significance in Table 2 is the consistency of the showings of pupils in the three subjects. Of the 23 pupils 9 are classed in the same grade in all three subjects; 8 in two subjects; and 6 have a different classification in each subject. Similar showings were found in the other grades.

The findings just set forth will be no surprise to those who have made even a cursory study of the scholastic ability of pupils in a single grade. The widely varying abilities of their pupils were well known to the Stoughton superintendent and his teachers and they had been for some time following a policy of promoting pupils by subjects, sending them into a lower grade for special work, and dividing the pupils in a single grade into groups according to their ability. The showing in connection with standard tests throughout the school not only justifies this policy, but would seem to indicate that it might be followed more extensively.

#### BOYS AND GIRLS COMPARED

The question of the relative ability of boys and girls often comes up in school work, especially in connection with the problem of interest in different subjects. Although the bearing of information concerning this question upon the practical conduct of the school was not obvious, as a matter of interest the scores of the girls and of the boys were compared.

Obviously, in comparing any two sets of scores many different methods may be used and the conclusions drawn would not necessarily be the same in connection with the different methods. In making the comparison between boys and girls, it seemed reasonable to employ a method which would give answers to the following questions: (1) Of the scores made by each sex, what percentage was found to be *higher* than the integral group in which the median for the room fell? (2) What percentage was *below* this group? (3) What percentage

was found *in* this group? (4) Of all the scores made by each sex, what percentage was in the "highest-in-the-room" group? (5) Of all the scores made by each sex, what percentage was in the "lowest-in-the-room" group?

In tabulating the data each test and each room were considered separately. Only the tests in Reading, Arithmetic, and Language were included. The scores above the median integral group which belonged to girls were counted as were those which belonged to boys. The same was done for those below the median group and those *in* this group. The cases where the highest score in a room was made by a girl were counted and the same for boys. In the same way the lowest scores belonging to each sex were counted. When the scores in each of these ten groups were totaled and percentages found, Table 3 resulted.

In all, 5,223 marks are included in this table, of which 2,959 belong to girls and 2,264 to boys.

On the whole the advantage is with the girls. In the three subjects taken together 45 per cent of the girls' scores are above the median group, while only 38 per cent of those belonging to the boys are equally high. Below the mid-group we find only 39 per cent of the girls' scores, but 44 per cent of the boys'. Of all the scores belonging to girls 9 per cent were in the "highest-in-the-room" group, while the corresponding percentage for boys is 6. The "lowest-in-the-room" scores show the same relative ability, where we find 5 per cent of the girls' marks, but 7 per cent of the boys'.

The total differences indicated above are due to Language more than to either of the other two subjects. In Arithmetic the boys almost hold their own. Five tests were used in this subject, *viz.*, Woody's scales for each of the processes and Clapp's problem test. It is interesting to note that in the latter test, where reasoning is involved, only 40 per cent of the girls' marks were above the median group as compared with 50 per cent of the boys'. Below the median group were found 43 per cent for the girls as compared with 38 per cent for the boys.

TABLE 3  
 SHOWING HOW BOYS AND GIRLS COMPARE IN ABILITY IN THREE FUNDAMENTAL SUBJECTS. The Upper Numbers Indicate Scores, and the Lower Ones Are Percentages, These Being in Terms of Total Number of Scores Made by Each Sex.

	Relationship to integral group in which median is found						Highest room-score		Lowest room-score	
	Above		In		Below		Girls	Boys	Girls	Boys
	Girls	Boys	Girls	Boys	Girls	Boys				
Reading	487 48	314 41	155 15	131 17	380 37	319 42	112 11	53 7	65 6	83 11
Arithmetic	376 40	291 38	212 22	194 25	364 37.5	291 37.5	92 10	80 10	63 7	54 7
Language	474 54	245 34	111 12	89 12	300 34	390 57	55 6	7 1	14 2	33 5
Total	337 45	850 38	478 16	414 18	1144 38	1000 44	259 9	140 6	142 5	170 7

## DIAGNOSIS OF WORK IN READING

No particular purpose would be served by reporting in detail the results of the reading tests in the various rooms, hence such data are omitted.

Very definite efforts were made to analyze the papers of pupils in the various tests so that some basis or bases for remedial or advanced work might be suggested. Although the results were not what the importance of reading in general would demand in the way of diagnosis, they are reported in part, with the hope that the methods used may prompt others to undertake work of this kind which may be more successful.

In connection with Monroe's tests an attempt was made to classify the errors made by pupils with the view of ascertaining what types of errors were made most often. It was found that the exercises could be arranged in five groups, and the study was made on that basis.

The first thing that suggested itself in looking for types of exercises was that in certain exercises the answer was to be indicated in a particular manner, by underscoring a word or drawing a line around it—all such exercises are included in Group I. Such exercises as the one about the relative weight of oil, milk, and water (No. 1, Test II) require the power to reason and to indicate the conclusion by answering a direct question—these are classified as Group II. There are certain exercises, *e. g.*, No. 1 in Test I, where the correct answer is found in the words of the exercise and is to be indicated by answering a direct question—these form Group III. The next group is made up of a half dozen exercises, illustrated by No. 11 in Test II in which the pupil is to choose from a suggested list the word that expresses the idea of the exercise. The last group contains the five exercises that involve reasoning and the necessity of indicating the conclusion by choosing between two alternatives as illustrated in No. 9, Test II—"if dry, draw a line under air; if wet, draw a line under rain." It will readily be seen that Group I overlaps the other four.

The five groups are as follows:

I. Indicating the answer in a particular manner:

Test I. Ex. 11, 12, 13, 15, 16.

Test II. Ex. 6, 7, 9, 10, 11, 12, 14.

II. Reasoning and indicating conclusion by answering a question:

Test I. Ex. 3, 7, 10, 13.

Test II. Ex. 1, 4, 5, 7,

III. Finding answer in words of the exercise and answering a direct question:

Test I. Ex. 1, 2, 4, 5, 6, 8, 9, 14.

Test II. Ex. 2, 3, 6.

IV. Choosing from a suggested list the word that expresses the idea of the exercise:

Test I. Ex. 15.

Test II. Ex. 10, 11, 12, 13, 14.

V. Reasoning and indicating answer by choosing between two alternatives:

Test I. Ex. 11, 12, 16.

Test II. Ex. 8, 9.

A list of the errors made by all the pupils in the four upper grades and about half of those in grades 3 and 4, 402 pupils in all, was made. The number of pupils who attempted each exercise was recorded also so that the per cent of errors could be calculated. The errors were classified according to the groups described above, and the ratio of the number of errors to the number of attempts was expressed in per cents. The results are given below:

TABLE 4

SHOWING PERCENTAGES OF ERRORS MADE IN CONNECTION WITH VARIOUS TYPES OF EXERCISES IN MONROE'S READING TEST.

Group	Attempts	Per cent of attempts wrong
I	1559	4.7
II	1513	10.4
III	1779	11.0
IV	670	14.3
V	639	23.0

The above analysis seems to indicate that after pupils have become accustomed to tests of this kind (as was the case with these pupils), the errors in Group I are negligible. In many



cases where this type of error occurred the wrong answer was indicated also.

It is doubtless true that abilities required by Groups II and V have much in common, and drill for one will improve the other also. The large percentage of errors in Group V indicates that the pupils need drill in the power of concentration—the power to hold three or more ideas in mind at the same time for the purpose of comparing them. Material for such drill might be found in problems in arithmetic, in texts in hygiene, history, and geography, in rules for playing games, and in instructions for work in manual arts and home economics.

Exercises in expressing the meaning of a whole paragraph in one word, or the thought of a page in a single sentence, would be valuable drill to improve the type of reading ability required by the exercises in Group IV.

To be most helpful such a study as this should be made for each room, or, better still, for individual pupils.

The papers in Thorndike's Scale Alpha 2, Parts I and II, were analyzed with a view to seeing what kinds of interpretations were most difficult for the pupils. The following classification was made of the exercises:

**Part I.**

**I. Finding answers in paragraph:**

- Set I. Questions 1, 2, 3.
- Set II. Questions 1, 2, 3, 4.
- Set III. Questions 1, 2, 3, 7.
- Set IV. Questions 1, 2, 3, 4, 5, 6.

**II. Reasoning:**

- Set III. Questions 5, 6.
- Set IV. Question 7.

**III. Following directions and observing carefully:**

- Set III. Question 4.

**Part II.**

**I. Finding answer in paragraph:**

- Set IV. Questions 1, 2, 3, 4, 5, 6.
- Set V. Questions 1, 2, 3, 7.
- Set VI. Questions 1, 2, 3.

**II. Reasoning:**

- Set IV. Question 7.
- Set V. Question 8.
- Set VI. Question 4.
- Set VII. Questions 1, 2, 3, 4, 5.

## III. Following directions and observing carefully:

Set V. Question 4.

## IV. Summarizing the paragraph:

Set V. Questions 5, 6.

Doubtless, many would not agree with the above classification. It will be noticed that an exercise is classed as a reasoning exercise even though it may involve nothing more than the translation of certain words in the paragraph into other words, *e. g.*, Question 1, Set VII, Part II. No attempt is made to justify the classification, but it was thought to be reasonably fair.

The work of pupils in Grades 4, 5, and 6, in connection with Part I of the test was analyzed and that of Grades 7 and 8 in connection with Part II. Table 5 shows the results of this analysis:

TABLE 5  
SHOWING THE PERCENTAGES OF ERROR IN CONNECTION WITH THE  
VARIOUS TYPES OF EXERCISES IN THORNDIKE'S  
READING SCALE, ALPHA 2.

Type of exercise	Grades 4, 5, 6			Grades 7, 8		
	Pupils	Answers	Per cent wrong	Pupils	Answers	Per cent wrong
Answer in paragraph	264	4480	18	163	1956	26
Reasoning	264	792	28	163	1304	60
Following directions	264	264	21	163	163	60
Summarizing	-----	-----	-----	163	163	41

Table 5 shows conclusively that the difficult kind of interpretation for pupils in the school is that which involves simple reasoning or the drawing of inferences. This is not surprising when it is remembered that practically all of the reading material which is put into the hands of pupils requires simply that they "find the answer in the paragraph." The study above at least raises the question as to whether or not material requiring more concentrated attention and more frequent opportunities for tested judgment should not be introduced into the school.

There were found in the reading material in the school, and especially that used in a supplementary way, many selections

that might be classed as of the "informational-story" type. These are stories which attempt, *e. g.*, to depict the lives of primitive peoples by wrapping up in a story of a boy of primitive times, the manners and customs of his time, or to make clear a scientific truth or event by narrating an incident concerning some object in nature which was affected by the truth or concerned in the event.

As a test of the pupils' ability to interpret material of this sort the following story was paraphrased from a poem and used as material for a test in Grades 6, 7, and 8:

#### A STORY

Hundreds and hundreds of years ago, so many, in fact, that none of us can tell how many, somewhere in a valley, there grew a fern, delicate, green, and slender. When the breezes crept down under the trees, they waved the fern gracefully about. Now and then a playful sunbeam darted through the leaves and found the fern; and at night drops of dew stole silently in and made a glistening crown upon its head.

There were no children to find the fern for it was so long ago there were no children. Great fishes swam in the sea, and on the plains and in the forests there were animals of wondrous shapes and enormous size. Even the trees grew larger than man has ever seen. The little fern, however, grew in its own sweet way, spread its leaves, and became more beautiful every day.

Suddenly one day the earth heaved up mighty rocks and threw them all about. The ocean broke loose and flowed over the land. It drowned the animals and tore up the great trees. The little fern was buried deep in the moist clay.

Many centuries passed by and the soft clay that clasped the fern hardened into stone. Then one day a thoughtful man who studied nature's secrets wandered into a valley. He studied the flowers; he listened to the birds; he watched the fishes at their play. As he walked, he saw, lying in his path, a queer little rock. When he looked more closely he saw upon the rock a strange design as if some fairy had traced with magic pencil the picture of the little fern.

Is it not wonderful that a thing so delicate as the fern could be kept so that after thousands of years man could find it and understand its history? If one looks closely he may often find "pictures" of plants on stone as this man did.

The following questions were asked in written form:

1. What title would you suggest for the story?
2. What question do you think the story is intended to answer?

3. What part could be omitted and still leave the meaning clear?

The guiding purpose in selecting the questions above was to ascertain whether or not the pupils in any way grasped the idea that the story was intended to tell them how fossils are formed. In determining the number of correct interpretations credit was given in connection with any one or more of the questions, just so there was any evidence anywhere of an understanding of the story. A pupil may have written for No. 1, "How fossils are formed," and omitted the other two; or he may have omitted No. 1 and in connection with No. 2, said "How do pictures get on stone?" Any one of such answers gave him full credit for a correct interpretation.

The following percentages indicate the correct interpretations for the three grades: Grade 6, 2 per cent; Grade 7, 14 per cent; and Grade 8, 13 per cent.

These percentages are extremely low. The writer would not suggest any final conclusion from this simple test, but he would suggest that some very careful attention be given to the interpretations placed by pupils upon such material. If its correct understanding is impossible when the pupil works alone, it would seem that such stories should be studied in class or supplanted by other material.

## SECTION II

### INDIVIDUAL ROOMS AND PUPILS

#### THE RESPONSIBILITY OF THE TEACHER

One of the common objections to standard tests on the part of teachers is that they are not a full measure of their work and yet are liable to be so interpreted. Without any doubt the responsibility of a teacher for the showing made by her class on a test has been overrated in many instances. Information such as that presented in Table 1 has been interpreted as being a direct comparison of the efficiency of teachers.

Even momentary consideration would seem to force the conclusion that such an interpretation cannot be put upon the table. The education of a pupil in a public school is a matter of cooperative and cumulative effort. What a fifth-grade pupil, *e. g.*, knows or does not know is not chargeable to the account of his fifth-grade teacher, but in large part to the joint account of this teacher and those that have taught the pupil in preceding grades. In the first grade there is the difficulty of devising tests that constitute any adequate measure of the work of teachers since the methods used vary so widely. For example, one teacher emphasizes methods that arouse interest in subject matter in reading, while another emphasizes word drill, and still another the correct interpretation of subject matter. All of these methods have the same ultimate purpose, but the ability of pupils in two rooms as measured by a single test at the end of the year may vary widely while the same two groups at the end of the second or third year may be practically equal. A conspicuous example of wide variation in first grades is found in Table 1 in the case of the Haggerty tests for reading.

The statements in the preceding paragraph are not intended to absolve the teacher from *all* responsibility for the showings of her pupils. She is *one* of the factors that has produced the showing and as such should feel her due share of concern.

Presumably, standard tests constitute a measure of the abil-

ity of a school in connection with the fundamentals of the various subjects. Without any question, one duty of the school is to develop such ability on the part of each pupil. It is not possible, or desirable, to develop this ability to exactly the same degree in the case of each pupil, but a school should be reasonably sure when its pupils leave the eighth grade that they are fairly familiar with the essential elements of the various subjects.

The ability of a school to do this is dependent upon many elements, *e. g.*, previous work of its pupils in schools from which they have been transferred, regularity of attendance, the choice of methods of instruction and textbooks, and the native ability of pupils.

Each of these factors and many other minor ones play parts in creating conditions such as those set forth in the section on the classification of pupils, particularly in Table 2.

For various reasons a pupil cannot always be placed in the room or grade in which the work as a whole best suits his individual scholastic needs. So far as concerns the essentials of a subject one pupil in a sixth-grade room, *e. g.*, may need the work ordinarily given in the fourth grade, while another pupil may easily take up the work of the seventh grade. Not only is this true, but it often happens that in connection with the essentials of a subject one room, as a whole, will exceed another of a higher grade.

All this means that a teacher has before her the task of not simply following the outline of work for her grade, but of ascertaining where her room as a whole and where each individual pupil stands in the line of progress towards the mastery of the fundamentals in the various subjects.

Obviously, then, it is not sufficient that those responsible for the school know simply how the school as a whole stands in the various subjects, but they should know also how each room and each pupil stands. The more detailed this information the more effective may be the work of each teacher, and consequently, of the school as a whole in conducting remedial as well as advanced work.

## PLAN FOR REPORTING RESULTS TO TEACHERS AND PUPILS

In order to set forth as fully as possible such information as the above, a detailed analysis of the work in the different rooms and of that of individual pupils was undertaken. The methods used in this analysis and typical results are presented next.

In the beginning of the survey each pupil in a room was given a number which he retained throughout the entire work.<sup>7</sup> As the tests were completed and the papers scored the results in each room were presented as in Table 6. In this table the numbers on the base line indicated values or scores and the numbers above refer to individual pupils, *e. g.*, pupils No. 15 and 16 each made a score of 44.

TABLE 6

SHOWING HOW THE RESULTS OF TESTS WERE REPORTED TO TEACHERS.  
(SIXTH GRADE WEST SIDE SCHOOL.) Numbers on the Base Line  
Indicate Scores and Those Above Indicate Individual Pupils.

Arithmetic—Clapp's Test													
Standard median		-----63.6		38								32	
Class median		-----70.5		23		30							
				34		17		6		22			
		16		21		19		7		18		3	
2		15		26		10		4		1		20	
								24		5		14	
												9	
												11	
32		36		40		44		48		52		56	
60		64		68		72		76		80		84	
88		92		96		100							

The results of all the tests used in a room were arranged as indicated above on a single large sheet of cardboard and became the property of the teacher after being explained to the pupils by her. On this card the standing of any pupil in a number of tests (18 in the case of sixth-grade pupils) could easily be found and the showings of the class compared with the standard medians.

One of the many difficulties in connection with the supervision of schools is for the supervisor to secure, or if once secured, to retain in convenient form adequate records of the work of individual pupils. Yet the progress which pupils make under a teacher's instruction is the one and only test of that teacher's instructional skill, and if the supervisor is to be the judge of the teacher's success it would seem that complete records of each pupil's progress should be available.

<sup>7</sup> Girls were given even numbers and boys odd.

After all, however, the mere evaluation of a teacher's work by a supervisor is of relatively small consequence when compared with the help which may be extended to the teacher when both the supervisor and teacher have in mind a scholastic "picture" of each child in the room.

Since so many objective tests were being used in the survey, it seemed that advantage should be taken of the opportunity to prepare simple records for individual pupils which could be filed for ready reference by teachers and supervisor.

In choosing terms and devising a form for such records the following considerations appeared: (1) The record should be graphic and yet fairly definite; (2) the measures of the pupil's work should be expressed in common terms—common for all pupils and for all subjects; (3) the form should afford room for records during the following years.

The above and other minor considerations gave rise to the form on the opposite page, which has been filled out for a seventh-grade pupil.

The common standard to which all records of a pupil are referred in using the above form is the standard median for his grade in the various tests. This median is represented by the heavy black line passing horizontally through the middle of the lower part of the card and which is marked "100" at the left. A record on any test is expressed by locating a small circle above or below this line according as the record is more or less than 100 per cent of the standard for the pupil's grade. Finally these circles are all connected by a continuous line which enables a ready comparison with the standard line. The form on page 29 contains the actual record of a seventh-grade pupil and is to be interpreted as follows. The pupil's age is 105 per cent of the normal age for his grade. In speed of writing he exceeded the standard for his grade by almost 20 per cent. In quality of writing his score was less than 90 per cent of the standard score for his grade, etc.

Records for the following year may be entered in red ink or the circles connected by a broken line. During this year the pupil will be in a higher grade and, of course, is expected to reach higher standards, but these standards would still be represented by the same 100 per cent line.

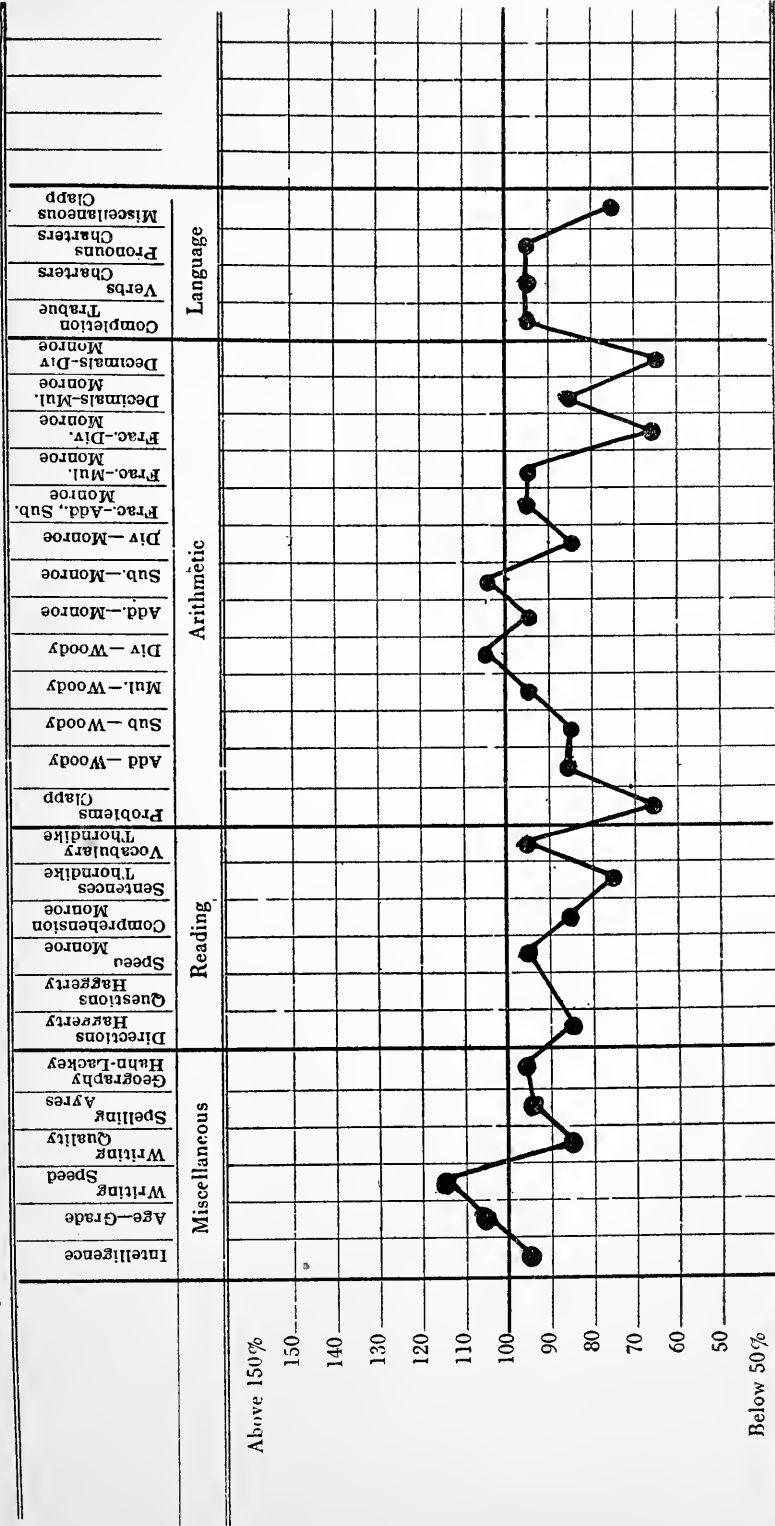


Bartz, Harry  
(Pupil's Name)

7  
(Grade)

West Side  
(School)

Miss Barry  
(Teacher)



Percentages are in terms of the pupil's record compared with the standard which is indicated by the 100% black line. (Devised by Frank L. Clapp, University of Wisconsin.)





Such cards were filled out for each pupil from Grade 1 to 8, inclusive.

#### METHOD OF DIAGNOSING A LANGUAGE SHOWING

After knowing how her room compares with the standard and what the score of each pupil is a teacher can more effectively adapt her instruction to the needs of a class if she knows the points on which the class as a whole and each individual pupil are weak.

To afford this information the points in each test were listed and the success or failure of each pupil in connection with each point indicated. This phase of the work is illustrated in Table 7, which concerns the pupils in the sixth grade of the West Side School and has to do with Clapp's test for Correct English. Numbers at the top indicate individual pupils and the checks indicate errors or omissions.

In Table 7 the tabulation has been rearranged from the original in order to show the percentages of success on the various points for the class as a whole in decreasing order. It is to be noted that these percentages vary from 100 for five of the points in the test to 8 for two of them. Just where in the list the teacher should begin drill for the entire class is perhaps a matter for her to decide. Since this test is intended as a measure of language habits rather than of language knowledge, it was suggested that it would perhaps not be a mistake for the teacher to drill the class on all points where the percentage was less than 75. Above this point drill could be individual and its character determined according to the errors made by each pupil.

Early in the beginning of the next year these tabulations from all the rooms together with the other language work of pupils in connection with the survey were used in outlining the work in language.

#### DIAGNOSING A SHOWING IN ARITHMETIC

In analyzing the work in Arithmetic, attention was given to Woody's *Arithmetic Scales* and Clapp's *Upper Grade Arithmetic*—a problem test. Monroe's *Diagnostic Tests* were used in the survey, but their tabulation and analysis proved to be too laborious for use in connection with the entire school.

In presenting this feature of the work a single fifth grade only will be used to represent the plan in general. This will be followed by a description of a special use of the results from all sixth and seventh-grade pupils.

Tables 8 and 9 show the method of tabulation employed. The problems are given in order to make clear the basis for the suggestions which follow the tables. Since the methods used in connection with each of the Woody scales, addition, subtraction, multiplication, and division, were the same, only the material relating to one of these, addition, will be given. The scale is reproduced below :

SERIES B  
ADDITION SCALE

*By Clifford Woody*

Date.....

City..... County..... School.....

Name.....When is your next birthday?.....

How old will you be ..... Are you a boy or girl?.....

In what grade are you?.....Teacher's name.....

(1)	(2)	(3)	(5)	(7)	(10)
2	2	17	72	3 + 1 =	21
3	4	2	26		33
—	3	—	—		35
	—				—

(13)	(14)	(16)	(19)	(20)
23	25 + 42 =	9	\$ .75	\$12.50
25		24	1.25	16.75
16		12	.49	15.75
—		15	—	—
		19		
		—		

(21)	(22)	(23)	(24)	(30)
\$8.00	547	$\frac{1}{3} + \frac{1}{3} =$	4.0125	$2\frac{1}{2}$
5.75	197		1.5907	$6\frac{5}{8}$
2.33	685		4.10	$3\frac{3}{4}$
4.16	678		8.673	—
.94	456		—	
6.32	393			
—	525			
	240			
	152			
	—			

75

(33)	(36)	(38)
.49	2 yr. 5 mo.	25.091+100.4+25+98.28+19.3614 =
.28	3 yr. 6 mo.	
.63	4 yr. 9 mo.	
.95	5 yr. 2 mo.	
1.69	6 yr. 7 mo.	
.22		
.33		
.36		
1.01		
.56		
.88		
.75		
.56		
1.10		
.18		
.56		

In determining the suggestions for the various classes in connection with the tests, only those problems were considered which might reasonably be considered to be within the ability of the class as indicated approximately by the class median. For example, in connection with the addition test, only the first sixteen problems were considered, the median number correctly solved by the class being 13.8. On the basis of the showings in Table 8 the following suggestions were made for the work of the coming year:

1. Special types of problems upon which the class as a whole needs drill.
  - a. Long-column problems—nine or more digits to the column and two or three columns.
  - b. Problems in decimals where the addends are to be arranged.
  - c. Problems involving U. S. money.
  - d. Problems involving fractions with denominators of different value.
2. New work.
  - a. A continuation of the types of problems indicated above, but with the individual problems more difficult.
  - b. Problems involving mixed numbers with denominators of different value.
  - c. Problems involving integers and decimals.

TABLE 8  
SHOWING THE WORK OF A FIFTH GRADE WITH WOODY'S ADDITION SCALE.  
V=incorrect. — =not attempted.

Pupil's Number	Number of Problem on the Scale																		No. Correct		
	1	2	3	5	7	10	13	14	16	19	20	21	22	23	24	30	33	36		38	
21									V										V		
25										V									V		
27	V									V											
19																					
15																					
10																					
17																					
13																					
1																					
3																					
5																					
7																					
9																					
11																					
17																					
26																					
24																					
22																					
10																					
14																					
16																					
18																					
20																					
8																					
6																					
4																					
2																					
30																					
No. of times missed	3	0	0	1	4	4	4	1	4	7	1	1	5	7	16	7	10	5	20	23	26

## CLAPP'S TEST FOR UPPER GRADE ARITHMETIC

1. Mr. Rook had 43 hogs and bought 24 more. How many had he then?
2. A cook buys 57 pounds of potatoes and uses 34 pounds. How many are left?
3. John has 18 cents. How many flags can he buy at 2 cents each?
4. Robert had 8 stamps on each of 6 pages. How many stamps did he have in all?
5. One platoon of soldiers had 16 men; another had 32 men; and a third had 48. How many men were there in all?
6. Out of a company of soldiers with 95 men, 27 were sick. How many were left for duty?
7. A boy delivered 36 papers each day. How many papers would he deliver in 24 days?
8. A man paid \$602 for 86 sheep. How much was that for each sheep?
9. William had 13 rabbits. After he sold 4 and bought 7 more, how many did he have?
10. If 5 sacks of sugar cost \$40, how much will 7 sacks cost?
11. Nellie had 10 pieces of candy. She ate one-half of them, and gave three pieces to Susie. How many pieces had she left?
12. One book weighs  $5\frac{1}{2}$  pounds and another one  $6\frac{1}{2}$  pounds. How much do they both weigh?
13. A girl picked  $6\frac{3}{4}$  gallons of berries one day,  $2\frac{1}{2}$  gallons the next,  $3\frac{1}{2}$  gallons the next. How many gallons did she pick altogether?
14. A piece of goods contains  $8\frac{1}{5}$  yards. If  $5\frac{3}{5}$  yards are cut off for a dress, how many are left?
15. How much will  $3\frac{3}{8}$  tons of coal cost at \$9 per ton?
16. A tank contains 15.5 gallons of gasoline. If 7.25 gallons are drawn out, how many are left?
17. If I can walk 3.5 miles in one hour, how far can I walk in 4.3 hours?
18. If it takes 5.3 ounces of silver to make one medal, how many medals can be made from 21.2 ounces?
19. A man had \$2,800. He spent one-half of his money for a house and one-fourth of what was left for a horse. How many dollars had he left?
20. A yard is 42 feet long and 38 feet wide. How many square feet are there in it?
21. If I buy a house for \$4,800 and gain 20 per cent when I sell it, how many dollars do I gain?
22. A lot is 126 feet long and 63 feet wide. How much will it cost to put a fence around it at 40 cents per yard?
23. What will be the interest on \$4,200 for 6 years at 5 per cent?
24. If I buy a cow for \$63 and sell her for \$84, what per cent do I gain?
25. A man sells 18 cattle averaging 1,000 pounds in weight at \$9.50 per hundred pounds. How much does he receive for them?



TABLE 9

SHOWING THE WORK OF A FIFTH GRADE WITH CLAPP'S ARITHMETIC TEST.  
 V=missed on account of process. X=missed on account of method. ---not attempted.

Pupil's Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	No. Correct
8	V					V	X	V		X					V	X	X	X	X	X						10
1		X	X			V	X	V	X	X						X	X	X	X	X						14
5			X	X					X	X																5
3																										10
19																										12
7																										10
6																										10
25																										11
22																										14
27																										7
17																										13
11																										14
19																										11
14																										15
18																										7
20																										13
13																										9
16																										15
15																										14
21																										2
26																										12
24																										18
30																										13
10																										11
4																										13
27																										11
12																										18
No. of times missed on account of process	4	0	4	0	1	5	1	7	2	0	0	2	1	6	7	7	4	3	0	0	1	0	0	0	0	0
Wrong method	1	1	5	4	1	0	5	7	6	25	6	1	2	3	4	12	21	15	20	17	7	7	7	7	2	
Not attempted	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	5	6	10	19	19	20	20	20	25	

The following suggestions for the class were offered:

(1) Careful attention should be given to the processes involved in those problems missed, although the right method was used. This seems to be a matter of attention to individual pupils, since these errors are scattered throughout the test.

(2) Concrete problems can hardly be classified by types, but it is suggested that problems involving the same kinds of conditions as those in problems frequently misinterpreted be given to the class repeatedly for the purpose of interpretation especially. Such problems as No. 10 need special emphasis.

(3) Problems should be stated in different ways.

Clapp's test lends itself more readily to diagnosis in the grades above the fifth.

Attention was called to the following pupils and the kind of work in which they were weak indicated:

No. 5—written problems.

No. 3—subtraction.

No. 25—addition.

No. 27—all the processes and written problems.

No. 19—addition and multiplication.

No. 18—written problems.

No. 13—all the processes and written problems.

No. 21—written problems.

No. 30—subtraction.

No. 10—division.

#### REMEDIAL AND CONSTRUCTIVE WORK IN SPELLING

In Spelling, the showing in Table 1 was made in connection with twenty-five words from the Ayres list. As a part of the survey and as a basis for remedial and constructive work in this subject the entire 1,000 words were pronounced in each room containing grades above the second and records were kept of the work of each pupil.

As a working device in this connection a book for each room was prepared as follows. The 1,000 words were mimeographed in columns of 50 words each. These columns were then separated and pasted singly at the left of blank sheets of paper 11x17 inches. A single book was then made up by taking twenty of these sheets with the words arranged in order of difficulty. Pupils in each room then ruled the sheets in both

directions and wrote in the name of each pupil at the top. The words were pronounced at the rate of 100 per day. Each pupil corrected his own work by checking the words missed and these checks were then transferred to the book either by pupils or by the teacher. These books were to serve as the text in Spelling the next year. The plan is for each pupil to learn thoroughly the words he missed which are below the 100 per cent standard for his grade. The teacher then takes the next column of words (on the scale, not in the book) and the class studies these words until the median for the class is equal to the standard, after which the work is individual and limited to those pupils who are not yet up. At frequent intervals all of the words preceding the point at which the class is working are reviewed in order to be sure that their correct spelling has become a matter of habit.

#### GROUPING OF PUPILS FOR INSTRUCTION

Since the pupils from all the sixth grades are gathered into the seventh grade of the Junior High School and divided into groups according to scholastic ability, a study was made of the scores of these pupils in each arithmetic test and a certain grouping suggested. The same was done for the pupils in the seventh grade. Table 10 shows the number in each of these groups together with group medians and standard scores. Scores for the lower grades are added for purposes of comparison.

The pupils in each of the four groups for Grades 7 and 8 were reported and it was suggested that classification for the work of the following year be made on this basis if possible.

One of the problems which arise in any high school is the proper introduction of freshman students. Many pupils during their first year find themselves misunderstood scholastically and unable to do the work which is expected of them.

In order to protect the weak pupils in the ninth grade as far as possible during the coming year the following criterion was applied to the scores of the eighth-grade pupils in the various tests: How many scores of each pupil fell in the lower two-thirds of the first, or lower, quartile for the class? It was thought that those pupils whose scores fell in this group any considerable number of times in proportion to the total number of tests should receive special attention.

TABLE 10  
 SHOWING THE MEDIAN SCORES IN ARITHMETIC OF FOUR GROUPS OF PUPILS IN THE SIXTH AND THE SEVENTH  
 GRADES WITH THE SCORES FOR THE LOWER GRADES ADDED FOR COMPARISON.

Grade	No. of pupils	Clapp's Arith. Test		Woody Scales—Series B.																	
		Standard	Class	Addition		Subtraction		Multiplication		Division											
				Standard	Class	Standard	Class	Standard	Class	Standard	Class										
Third	20			9	10.5	6	8.4														
Fourth	29			11	11.5	8	8.4			7	10.3			5	6.2						
Fifth	27	13.2	12.3	14	13.8	10	11.9			11	14.4			7	9.8						
Sixth, Sec. A.	27	15.9	19.8	16	16.7	12	14.1			15	16.9			10	12.6						
Sixth, Sec. B.	27	15.9	16.3	16	15.5	12	12.7			15	15.6			10	11.8						
Sixth, Sec. C.	21	15.9	13.3	16	13.6	12	11.8			15	13.5			10	10.9						
Sixth, Sec. D.	24	15.9	9.9	16	13.2	12	11.1			15	11.8			10	8.6						
Seventh, Sec. A.	24	18.6	20.3	18	17.9	13	14.4			17	18.7			13	13.1						
Seventh, Sec. B.	22	18.6	18.9	18	16.4	13	13.6			17	16.8			13	12.3						
Seventh, Sec. C.	20	18.6	15.9	18	16.3	13	12.9			17	15.8			13	11.4						
Seventh, Sec. D.	21	18.6	12.8	18	14.2	13	11.5			17	12.5			13	9.8						

Table 11 shows the pupils by number who were placed in this group and the number of scores belonging to each in the three fundamental subjects which were below the limit indicated above.

TABLE 11

SHOWING A GROUP OF EIGHTH-GRADE PUPILS WHO WERE WEAK IN THE THREE FUNDAMENTAL SUBJECTS. The numbers indicate the number of scores belonging to each pupil which were in the lower two-thirds of the first quartile for the grade. These pupils should receive special attention in their first year of high school work.

Pupils by Number	Reading (3 tests)	Language (5 tests)	Arithmetic (5 tests)
7	0	2	0
8	3	2	1
9	2	2	0
10	3	3	0
11	0	2	0
12	2	2	2
13	0	2	0
16	0	2	0
20	0	0	2
27	0	2	0
30	2	2	1
33	0	3	0
34	2	3	1
36	2	0	3
37	2	2	1
43	0	3	0
46	0	0	2
49	0	3	0
50	2	2	0
51	0	3	0
55	0	2	3
57	3	3	0
61	0	2	0
66	0	2	0
76	2	0	1
86	0	2	1
90	3	0	0
102	2	0	2

While in many tests some of the twenty-eight pupils indicated in the group in the above table do not have scores as low as the limit chosen, yet practically all of their scores were low and it would seem decidedly advantageous if these pupils could be grouped together and their work strengthened in the subjects indicated, by very direct drill. Their reading could be





TABLE 13  
SHOWING THE RESULTS OF THREE LATIN TESTS

	First Year		Second Year		Third Year	
	St. Med.	Class Med.	St. Med.	Class Med.	St. Med.	Class Med.
Henmon's Sentence 1.-----	10	12	13.8	14	18.2	19.6
Henmon's Vocabulary-----	71	80.7	84	94	95	94.4
Clapp's Vocabulary-----	86.4	86	97.4	94	99.8	100

The sum of the class medians in the above table exceeds that of the standard medians by 3 per cent, indicating a very gratifying quality of work in Latin as measured by the three tests.



SECTION III  
SOME SPECIAL PHASES  
GRADE-PUPILS' TIME

Amidst all the complexity of school organization, supervision, courses of study, records and reports, finances, schedules of classes, etc., etc., one thing would seem to be of prime importance, *viz.*, the time that pupils devote to the accomplishment of worth-while tasks. With the introduction of many new subjects, with portions of the school time given over to matters of health, of thrift, of charity, of celebration, etc., one sometimes wonders just what must be the effect upon the individual child's ability to work consistently and upon the teacher's ability to so plan and carry out the work in her room as to keep her pupils employed.

There is no intention in connection with the above statements to discourage work of the kind mentioned or to reflect upon its value. All of these activities are absolutely meritorious and the only question raised is one concerning the time available for work by the pupil in the fundamental subjects and the effective use of this time.

The question was studied by an examination of the daily programs as found in the various rooms and by detailed records of the activities of three pupils throughout a school day.<sup>8</sup>

There would be little if any advantage in presenting a summary of various room programs. The one below is doubtless typical, at least in respect to the total amount of time devoted to each subject. This is for a fifth grade.

TABLE 14  
SHOWING THE DAILY PROGRAM IN A FIFTH-GRADE ROOM

Time	Subject	Min.
8:30- 8:40	Opening Exercises.....	10
8:40- 9:05	Study Arithmetic.....	25
9:05- 9:30	Recite Arithmetic.....	25
9:30- 9:35	Calisthenics.....	5

<sup>8</sup>This study did not take into account interruptions in the daily schedules for the various kinds of work to which reference is made.

Time	Subject	Min.
9:35-10:00	Study Reading	25
10:00-10:15	Recess	15
10:15-10:40	Recite Reading	25
10:40-11:00	Spelling	20
11:00-11:25	Study Language	25
11:25-11:45	History, Hygiene, Citizenship	20
1:00- 1:20	Recite Language	20
1:20- 1:40	Study Geography	20
1:40- 2:00	Writing	20
2:00- 2:05	Recess	5
2:05- 2:25	Recite Geography	20
2:25- 2:45	Music	20
2:45- 3:05	Drawing, etc.	20

A study of the above program gives the following totals of time in minutes devoted each day to the various subjects: Arithmetic, 50; Reading, 50; Language, 45; Geography, 40; History, Citizenship, and Hygiene, 20; Spelling, 20; Writing, 20; Music, 20; Drawing or Library Reading, 20; Calisthenics, 5.

This means that if a pupil is given 50 minutes each day for a subject as in the case of arithmetic and reading, for six years, he has at his disposal for the mastery of that subject a total of 51,120 minutes, counting 34 working weeks to the school year. This equals 176 school days of 4 hours and 50 minutes each, which is the working time in the program given above. In terms of months this is equal practically to nine months of 20 school days each or to one school year.

It does not seem excessive for an individual to devote one entire school year to the study of a fundamental subject such as reading or arithmetic, nor does it appear that such a person could be expected to acquire a very complete mastery of the subject in that time.

However, as indicated above, there is another consideration in connection with the question, *viz.*, how much of the time available for work in the subject is actually used by pupils.

In order to throw some light on the latter question one of the members of the Survey class<sup>9</sup> observed three pupils, two fifth-grade girls and one sixth-grade boy, throughout an entire day. It should be added that these pupils did not know that they were being observed and supposedly worked as they ordinarily did.

<sup>9</sup> Miss Marion Breck, now head of the Department of Home Economics in the University of West Virginia.

In recording the way in which the time of the pupils was spent, Miss Breck classed it as "used" or "not used." In this classification she observed the following rules: (1) Any period which was supervised directly by the teacher was called a recitation, *e. g.*, the time used for dismissing pupils was classified under "recitation"; (2) time spent by pupils in a "desultory" way was divided, half being classed as "time used" and half as time "not used"; (3) some of the time classed as "not used" was a necessary part of the administration of the work, *e. g.*, the time necessary to distribute the Curtis Test papers, work with which formed a part of the lesson in arithmetic; (4) in the recitation, time was classed as "used" if the pupil was participating in the activities of the class or seemed to be giving fair attention.

Table 15 gives the results of the observation and classification:

TABLE 15

SHOWING HOW A SCHOOL DAY WAS SPENT BY EACH OF THREE PUPILS.  
Figures for Each Pupil A. B. and C. Indicate the  
Number of Minutes.

## Pupil A. Sixth-grade Boy

Subject	Time available			Time used		
	Study	Recita- tion	Total	Study	Recita- tion	Total
Arithmetic.....	28	30	58	4	22	26
Reading.....	28	23	51	26	23	49
Language.....	19	36	55	4	36	40
Geography.....	15	20	35	5	17	22
Hygiene.....	0	33	33	0	28	28
Spelling.....	0	14	14	0	7	7
Writing.....	0	20	20	0	15	15
Music.....	0	20	20	0	20	20
Story Telling.....	0	20	20	0	20	20
Op. Ex. & Dis- missal.....	0	12	12	0	12	12
Total.....	90	223	313	39	200	239
Percentage.....	28	72	100	43	90	75

## Pupil B. Fifth-grade Girl

Subject	Time available			Time used		
	Study	Recitation	Total	Study	Recitation	Total
Arithmetic.....	30	27	57	6	9	15
Reading.....	14	31	45	0	18	18
Language.....	34	17	51	22	17	39
Geography.....	23	17	40	11	16	27
Hygiene.....	0	33	33	0	33	33
Spelling.....	0	17	17	0	15	15
Writing.....	0	20	20	0	11	11
Music.....	0	22	22	0	20	20
Reading Report...	0	20	20	0	20	20
Op. Ex. & Dismissal.....	0	12	12	0	12	12
Total.....	101	216	317	39	171	210
Percentage....	32	68	100	26	80	66

## Pupil C. Fifth-grade Girl

Subject	Time Available			Time used		
	Study	Recitation	Total	Study	Recitation	Total
Arithmetic.....	30	27	57	10	8	18
Reading.....	14	31	45	0	24	24
Language.....	34	17	51	20	17	37
Geography.....	23	17	40	11	16	27
Hygiene.....	0	33	33	0	33	33
Spelling.....	0	17	17	0	15	15
Writing.....	0	20	20	0	9	9
Music.....	0	22	22	0	20	20
Reading Report...	0	20	20	0	20	20
Op. Ex. & Dismissal.....	0	12	12	0	12	12
Total.....	101	216	317	41	174	215
Percentage....	32	68	100	41	80	68

It appears in the above table that less than one-third of the time of the pupils in these grades is available for work independent of direct supervision by the teachers, the exact percentage being 32 for the fifth grade and 28 for the sixth. It may be that this is as it should be, but the writer is fully in sympathy with the somewhat common notion that we have too much *teacher-activity* in our schools and too little *pupil-activ-*

*ity.* To be sure, immature pupils cannot work without some direction, and it was doubtless true also that a considerable portion of the time classed as "recitation" above was actually used by the pupils to study. Superintendent Anderson stated that in his judgment, at least 50 per cent of the total time of the school day was so used.

Taking the three fundamental subjects, Arithmetic, Reading, and Language, adding the figures for all three pupils, and determining percentages, we find: (1) The total time, according to the programs, is divided about equally between study and recitation; (2) of the time available for study, 40 per cent is actually used; (3) of the time available for recitation, 72 per cent is actually used; and (4) of the total time 57 per cent is used. Of these three subjects the poorest showing is in arithmetic, where only 22 per cent of the time available for study is used and 45 per cent of the time available for recitation.

It is quite unnecessary to point out the difficulty of organizing the work in any ordinary schoolroom and of motivating it so that each pupil will use the full time. It may be that the use of from 66 to 75 per cent of the available time is all that can be secured from an average pupil and it may be also that in a subject such as arithmetic the percentage must necessarily be much less. The chief purpose in this part of the study was simply to set forth the actual situation as accurately as possible. The writer believes that one of the best criteria of instruction is the extent to which individual pupils are kept busy at worth-while tasks and that even more important than plans for presentation or for questioning is the matter of planning both recitation and study periods so that each pupil has something to do all the time.

It is obvious, if the average pupil devotes only three-fourths of the available time to work, that the total time which he gives to the mastery of a subject as set forth above (page 46) will be reduced from nine months to six and three-fourths. In view of this, can we wonder that pupils enter high school without the ability to read or to solve ordinary problems in arithmetic as is so often the case in the opinion of high school teachers?

SOME CHARACTERISTICS OF INSTRUCTION IN THE JUNIOR AND  
SENIOR HIGH SCHOOLS

It is obviously impossible in a survey such as the present one to visit individual classrooms and evaluate the work of instruction even if such subjective evaluation were worth anything.

Rightly or wrongly it was assumed that the general technique of instruction used in the school would be reflected in the reactions of pupils to a teaching situation.

With this assumption in mind, the principals of the Junior and Senior high schools were asked to select eleven pupils from each of the grades under their supervision, choosing them at random so as to secure a fair sampling of ability. These sixty-six pupils were given the directions below in written form and allowed as much time as necessary to complete the work. The text used was one with which the pupils were entirely unfamiliar:

Use the copy of Overton's General Hygiene placed on your desk. Do not open the book until the signal is given. Use the book freely in answering the questions given below.

Name..... No..... Grade.....  
Time beginning.....Time finished.....

QUESTIONS

1. Suppose you were the teacher. Write below an assignment for the next lesson. Tell definitely just what you expect your class to do.
2. How would you teach the lesson you have just assigned?
3. Suppose you were the pupil. How would you prepare your lesson if the assignment were based on Chapter IV, and your special topic were typhoid fever?
  4. a. Would you feel safe in believing what is told in this book? Why?
  - b. What is vaccination according to this book? Give the exact quotation.
  - c. Turn to page 235. Read the last sentence. It closes with the words "food producer (p. 214)." Now answer this question. How many calories of heat does a man produce per hour doing very light work? (Give exact quotation.)
  - d. Judging from the titles of the chapters, what chapter or chapters would you advise a cook to read? A public speaker? Tell exactly how you got your answer.

Now turn to the front page of your paper and put in the proper space the time (by the clock) when you finished this test. Then

hand your paper to the teacher in charge, being sure that the three pages are in proper order and pinned together at the left hand upper corner.

Questions one and two involving assignment and teaching-plan were prepared with the idea that the pupils would reflect the kind of teaching they had received and that it would probably be a reflection of the best teaching so far as the pupils were able to judge.

Question three, it was hoped, would give an insight into the student's habits of study as determined by the teachers' direction and requirement. There was an opportunity here for the pupil to suggest an intelligent plan of lesson preparation: the use of the index in finding the discussion of the special topic "Typhoid fever" (this was not discussed in the chapter assigned); and the use of definite references which they may have found helpful before.

In the fourth question, there was an attempt to find a few small details of teaching technique that would seem to characterize good work. In "(a)" the question involved was that of authority for statements, i. e., were pupils being given any basis by which they might judge the value of printed statements. In this case it was a question of looking at the title page and determining from the author's experience, connections, etc., his right to speak on this particular subject. In "(b)" the point involved was the use of the index or glossary. Part "(c)" required the accurate reading of two sentences and the intelligent use of a page reference. Part "(d)" involved the use of the table of contents as a quick and accurate means of securing the desired information.

No attempt is made here to give a detailed analysis of the results. The results are interesting and suggestive and would serve as a basis for an interesting and perhaps profitable conference between teachers and supervisors, and this type of test carefully prepared by the local supervisor could well be used as the basis for a certain amount of standardization of teaching technique.

In answering Question 1, it is significant that 57 of the 66 pupils suggested questions as the basis of assignment, and that 49 suggested chapter or page assignments. Four suggested outside references, five mentioned objective methods, one

would have notebooks used, and one would have the lesson studied in class.

In connection with Question 2, it is significant that 48 pupils made the teacher's questions the basis of recitation, and that 32 suggested discussion and demonstration, while 8 suggested a quiz, 6 would study the lesson as a part of the recitation, and 4 would read the lesson in recitation.

Question 3 showed only 30 out of 66 with a definite plan of lesson preparation, with 27 suggesting outside references, while only 4 were resourceful enough to find material in the book at hand by use of the index.

In Question 4, part "(a)," only 19 pupils were able to pass judgment on the author of the text used. In parts "(b)" and "(c)" 54 made proper use of the index or glossary, and 41 properly used a rather difficult page reference.

It is interesting to note that the pupils in the Junior High School did fully as well in general as the older pupils.

The results of this test and others similar to it would justify careful study on the part of supervisors and teachers. The development of strong independent methods of work on the part of pupils should be one of the chief objects in high school instruction.

#### HOW TEACHERS SPEND THEIR TIME

In view of the oft-repeated statements concerning the time put in on school work by teachers, an attempt was made to ascertain the actual conditions by asking the teachers to report: (1) The amount of time given to instruction, *i. e.*, class work; (2) the amount of time put in at the building on school work other than instruction, *i. e.*, playground or class supervision, preparation of work, marking of papers, etc.; and (3) the amount of time devoted to any phase of school work at home.

The showing is indicated in Table 16. Teachers reported in minutes, but in tabulating the returns fifteen minutes was called a half hour, while anything less than fifteen minutes was disregarded.



TABLE 16

SHOWING AMOUNT OF TIME DEVOTED TO SCHOOL WORK BY TEACHERS.  
TOTAL NUMBER REPORTING, FORTY-FOUR. Figures Are Num-  
bers of Teachers for Each Division of Time.

Hours per day	Instruction	Other school work at building	School work at home	Total school work in addition to instruction	Hours per day	Total for all school work		
0	--	1	14	--	3.5	2		
0.5	--	--	11	1	--	--		
1.0	--	10	10	2	6.0	2		
1.5	--	5	6	3	6.5	5		
2.0	1	9	1	8	7.0	9		
2.5	--	3	--	7	7.5	11		
3.0	2	9	2	7	8.0	5		
3.5	2	3	--	7	8.5	2		
4.0	5	2	--	3	9.0	4		
4.5	6	--	--	2	9.5	2		
5.0	23	--	--	2	10.0	1		
5.5	2	--	--	--	--	--		
6.0	3	2	--	2	13.0	1		
Median hours	-----	-----	-----	5.1	2.3	0.8	3.1	7.9
Average hours	-----	-----	-----	4.7	2.3	0.7	3.0	7.5

Apparently the teachers do but little school work at home, since 35 out of 44 do 1 hour or less, while 14 do none. Equally obvious, however, is the fact that the day's work is not complete when classes are "heard." Both the median and average for the time devoted to school work outside of instruction at the building is 2.3 hours, while the median for work at home is 3.1 and the average 3 hours. The total median day for the teacher is 7.9 hours and the average 7.5.

According to the above data the idea that teachers "work far into the night" is a pleasant (or unpleasant) fiction, while the notion that teachers have a "short day" is equally without foundation—the day in Stoughton being of the standard eight-hour variety.

#### RESULTS OF INTELLIGENCE AND SCHOLASTIC TESTS COMPARED

Effective school work depends largely upon the selection of such plans of organization, attendance regulations, motivation, etc., as will best enable and stimulate each individual pupil to work up to within a reasonable distance of his capacity. The

scholastic attainment of a pupil at a particular time depends upon the extent to which the school has succeeded in doing this in his case and upon his own native ability or intelligence.

Within recent years our schools have made large use of both scholastic and intelligence tests, the latter being used with the former as a basis for reclassification of pupils. Whether or not pupils are formally reclassified, it seems that any school should make an earnest and intelligent effort to ascertain to what extent the scholastic attainments of its pupils are commensurate with their abilities.

To this end it was planned to use an intelligence test throughout the school and to compare the showing of each individual pupil with his scholastic record in connection with the various tests. It was impossible to do this on account of the failure of the intelligence test material to arrive before the close of school.

In order to set forth the method for such work and to secure a basis for discussing its significance for schools, similar material from a survey conducted in another system the following year is presented.

As a measure of scholastic attainment, tests in the three fundamental subjects only, Reading, Arithmetic, and Language, were included. As a measure of intelligence, Pressy's Mental Survey, Schedule D, was used.

An ideal comparison of scholastic attainment would be obtained by taking a certain number, say twenty-five, pupils of the same age, with the same intelligence rating, and in the same grade. It was impossible, however, to find twenty-five such pupils. Twenty-four pupils were selected with practically the same intelligence rating. Their ages ranged from 10 to 14 and their grades from the sixth to the eighth. The records of these twenty-four pupils are presented in Table 17. The scores in intelligence are in percentages of the standards for the various ages and in the various scholastic tests the scores are the percentages which the pupil's scores are of the standard scores for his grade. The fifth column, "Scholastic Average," is made up by averaging all the percentages following.

TABLE 17

SHOWING HOW TWENTY-FOUR PUPILS IN VARIOUS AGE GROUPS AND OF APPROXIMATELY THE SAME DEGREE OF INTELLIGENCE COMPARE IN SCHOLARSHIP. Except in the First Three Columns, Numbers Are the Percentage Which the Pupil's Score Is of the Standard for His Grade.

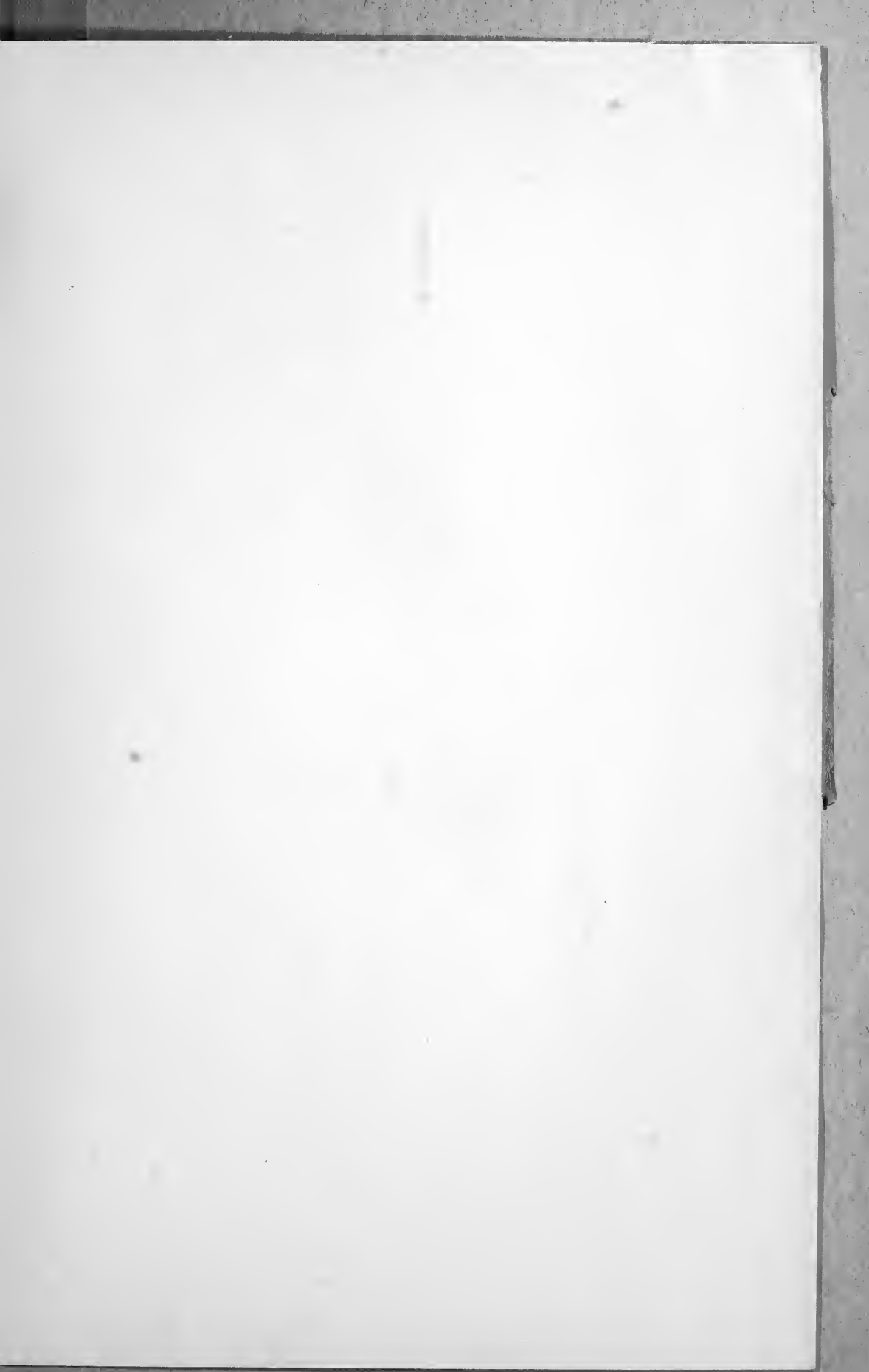
Pupils by number	Age	Grade	Intelligence Rating	Scholastic Average	Woody Add.	Woody Sub.	Woody Mult.	Woody Div.	Courts Add.	Courts Sub.	Courts Mult.	Courts Div.	Buckingham Problems	Monroe Rate	Monroe Comp.	Gray Readings	Clapp English	Comp. Story	Comp. Form
323	10	6	95	78	95	75	95	100	30	18	44	63	89	106	85	129	91	89	53
436	10	6	95	103	102	121	114	113	30	73	67	100	92	144	167	156	116	80	79
230	11	6	95	85	88	103	81	113	50	91	22	25	89	117	105	150	110	65	80
361	11	6	95	93	95	103	146	100	70	82	67	75	89	144	100	85	94	73	87
404	11	6	95	117	115	121	146	125	60	82	89	75	102	153	181	188	121	73	72
177	12	6	92	82	75	103	90	100	30	73	44	25	92	88	86	126	96	73	134
240	12	6	93	99	88	131	114	150	60	100	100	50	92	88	89	153	108	57	104
432	12	6	93	102	95	112	130	125	40	82	78	75	82	129	157	170	102	89	157
296	12	6	94	103	75	159	138	150	60	45	111	50	89	88	100	159	82	49	188
456	12	7	95	87	90	102	90	63	36	100	40	100	103	103	87	153	100	71	66
398	12	7	95	126	95	121	138	150					86	158	171	159	119	98	86
411	13	8	90	82	93	96	75	75	82	83	55	64	93	140	131	52	81	93	85
395	13	7	90	106	102	114	115	118	63	158	70	70	108	133	152	113	100	71	75
333	13	7	92	85	95		102	100	50	73	80	38	83	106	133	162	74	40	56
480	13	6	91	112	90		109	109	45	142	80	60	103	125	130	328	85	57	94
264	13	7	94	123	114	122	128	127	82	150	90	140	105	125	174	225	106	57	93
441	13	7	94	87	71	96	98	105	33	42	55	45	105	140	151	161	91	53	55
458	13	7	95	89	72	95	70	109	18	33	40	40	160	140	151	219	95	86	160
435	13	8	95	75	55	66	50	60	42	17	55	27	0	104	103	296	88	67	80
407	14	8	90	83	71	111	52	90	25	67	27	127	109	107	127	161	87	80	107
504	14	8	91	78	82	74	68	60	0	42	0	18	93	94	64	93	98	80	163
453	14	8	93	76	49	89	52	75	67	75	55	55	98	140	134	190	98	67	96
439	14	8	93	103	66	104	98	90	67	75	55	55	98	114	127	211	109	67	210
498	14	8	95	78		104	104	98	50	33	45	9	100	104	115	93		53	100

The table is to be interpreted as follows: The first two pupils, Nos. 323 and 436, are each 10 years of age; they have the same intelligence rating, 95 per cent of the standard for their age; No. 323 has a scholastic average of 78 per cent of the standards for the sixth grade and No. 436 has a scholastic average of 103 per cent of the same standards; the remaining figures indicate the standings of the two pupils in the different tests. In a similar way comparisons may be made of other groups of the same age in the same grade.

Taking the entire twenty-four pupils we have a group with practically the same ability, but with composite scholastic attainments ranging from 75 per cent to 126 per cent of a reasonable or average attainment.

The question for the school to answer is, "What accounts for these great differences in scholastic attainment?" With the same quality of raw material in each of twenty-four cases, the results are greatly different. Are the differences due to differences in regularity of attendance, to differences in effectiveness of instruction, to differences in motivation, or to—what?

It is not suggested that pupils with the same degree of intelligence can be brought to the same level of scholastic attainment, but it seems that any school would do well to give careful attention to the relationship existing between the quality of its material and of its product.













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